Essential *for* Safety

AFTER 100 YEARS, THE ASME BOILER AND PRESSURE VESSEL CODE CONTINUES TO EVOLVE TO MEET THE NEEDS OF ENGINEERS USING THE MOST ADVANCED TECHNOLOGY.

1911

THE COMMITTEE FORMS

ASME forms a committee to create a uniform set of standard specifications for the construction of steam boilers and pressure vessels, later to be known as the Boiler and Pressure Vessel Code Committee.

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The first edition of what has become the ASME Boiler and Pressure Vessel Code was published in 1914. The Code has continued to expand and adapt over the years to meet the needs of new technologies, many unimagined 100 years ago. The Code continues to meet new challenges and to extend its influence in the cause of safety around the globe. In this issue, we hear from a few people representing all those for whom the Code is literally a way of life.

The Code has grown from a single 114-page book to volumes that fill a bookshelf—or a disc.

Dedicated Now and From the Start

BABCOCK & WILCOX, POWER GENERATION GROUP

Steam is one of nature's most useful and powerful phenomena; at Babcock & Wilcox it is present in some fashion nearly everywhere. From heating the offices in which we work, to the driving force behind the power plants we design.

The power of steam was once frighteningly evident; 1,200 people were killed in the U.S. between 1898 and 1903 in 1,900 separate steam boiler explosions. Imagine what it would be like to be in a restaurant and not know if the boiler below you would explode, or to know if your kids were safe at their school, things we thankfully take for granted today.

Several high-profile boiler accidents, such as a 1905 explosion and fire that killed 58 people at the Grover shoe factory in Brockton, Mass., ultimately led to an industry initiative to create a set of universal design and manufacturing standards for boilermakers, a Code that would help safety standards catch up to the rapid technical advancements of the boiler industry. The American Society of Mechanical Engineers published the first ASME Boiler and Pressure Vessel Code in 1914, and The Babcock & Wilcox Company—the leading boilermaker in America at the time—provided instrumental engineering and technical support for the publication.

B&W was also a stalwart and vocal advocate for industry-wide adoption of the Code, even as some companies resisted. Babcock & Wilcox became the holder of compliance certificate No. 1 under the new Code.

"From a manufacturer's perspective, the Code is without a doubt about safety, and no less today than when it was introduced one hundred years ago," said Kip Alexander, vice president of technology for B&W's Power Generation Group. "Safely harnessing the power of steam is quite literally why B&W exists, and our history, which we're very proud of, is almost inseparable from the history of the Code."

As time has passed and safe operation of pressurized equipment has become a normal practice, other benefits of the Code have become apparent. "While protecting life and property is always the priority, from a quality standpoint, the ASME Code provides a framework by which an organization can build consistent processes," said Ron Pulliam, group quality director for the Power Genera-

1914

FIRST EDITION

ASME publishes the first edition of Rules for the Construction of Stationary Boilers and for Allowable Working Pressures. Today, in much-expanded form, it is commonly known as the ASME Boiler and Pressure Vessel Code.

2

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"While protecting life and property is always the priority, from a quality standpoint, the ASME Code provides a framework by which an organization can build consistent processes. It also provides a level playing field for all manufacturers, suppliers, and installers."

tion Group's boiler and emissions control division. "It also provides a level playing field for all manufacturers, suppliers, and installers. When you're all playing by the same set of rules and adhering to the same standards, you and your customers can be confident of the quality of your finished product, and nobody is tempted to cut corners on safety or quality."

The Code is ingrained in literally every part of Babcock & Wilcox's design and manufacturing process. The thermal-hydraulic and performance engineer begins with specifications for pressure and temperature and the Code returns wall thickness and material. The quality engineer relies on the Code to define essential non-destructive examination before first operation.

If one thing can be gleaned from the growth of the original Code from 114 pages to its modern form of binders filling an entire bookcase (that is, unless you're consulting the digital edition) is that details matter. The volunteers who meet four times a year to maintain and extend the Code are completely dedicated to translating sometimes painfully gained experience into rules that strive to protect people. It's why competitors come together and share critical knowledge with one another and the public, and why volunteers dedicate time that almost universally extends well beyond the traditional 40-hour work week.

From B&W founder George Babcock serving as the ASME's sixth president in 1887, to the numerous B&W employees who serve on committees today, Code participation has always been an integral part of our engineering culture.

WELDED STRENGTH

The fusion welded drum, tested to failure in 1930, led to later high-pressure vessels. It is on display in Chattanooga and has been designated an ASME Historic Mechanical Engineering Landmark.

Roberto Garcia, quality control manager at B&W de Monterrey, a Power Generation Group unit in Mexico, is the first Code committee member from Mexico, and contributes his expertise to the Subcommittee on Boilers and Pressure Vessels in Spanish. His participation highlights the rapidly growing importance of international collaboration for both industry and the Code.

"It is extremely important for the Code to have a presence in all those countries that are lacking or have no safety standards," Garcia said. The Code continues to expand internationally, and according to Garcia, "We will find more technical leaders around the world that share our interest to develop the Code and make it stronger. I would really like to see the Code translated into other languages. This would allow the Code to reach other countries and expand our spirit and frontiers."

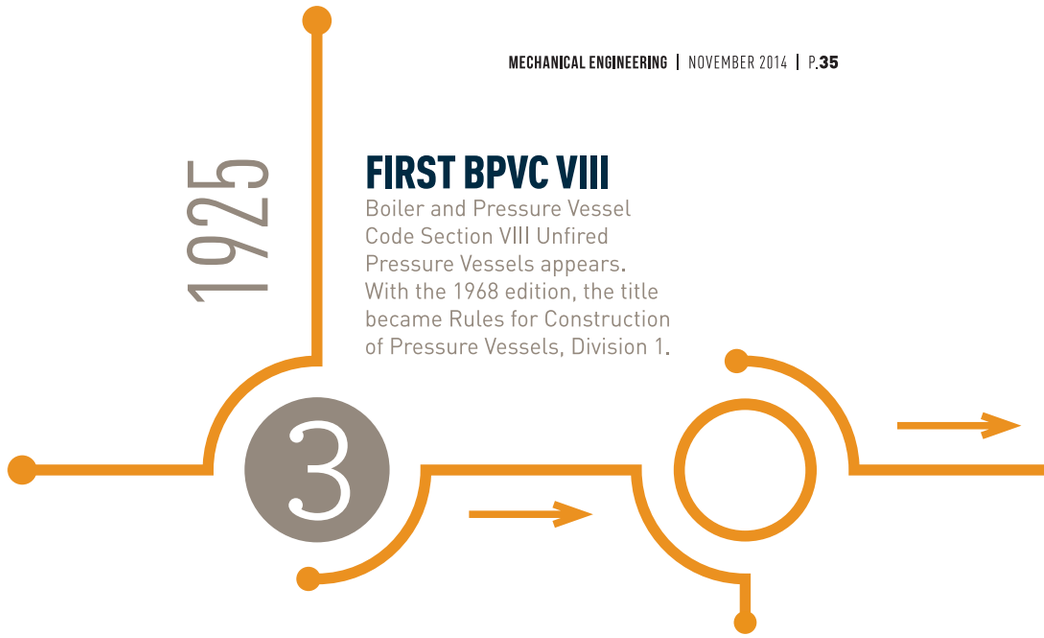
The B&W corporate commitment to the Code has never diminished, even during the sometimes brutal economic conditions the power generation industry has seen over the last 100 years; because this commitment does as much for the volunteers as they do for the Code.

William Bees, who retired from the Babcock & Wilcox Nuclear Operations Group, Inc., and was the 2013 recipient of the ASME S. Y. Zamrik Pressure Vessel & Piping Medal, says the time he volunteered to work on the Code expanded his horizons and points of view.

"It was a rewarding experience and I worked with many talented individuals," Bees said. "When you work so closely with such people, you're always challenged to look at problems in new ways and from new perspectives."

Bob McLaughlin, former director of quality assurance at Babcock & Wilcox Nuclear Energy and current vice chairman of ASME's Section I standards committee agrees. He said he finds himself being educated every time he attends an ASME Code meeting. "We really get a great education from our peers on the Code, engineering and ideas, concepts and technologies," he said.

This collaboration and learning is important as ever, as the Code is facing the same challenges as the industry it serves: experi-



enced engineers are retiring and fewer young engineers step into the gaps. It is an exciting time to be involved in the power generation industry and the Code because there are many opportunities to contribute, and many people willing to share their experience.

One of the more interesting aspects of the Code is that it is far from precluding innovation. Technology has made great strides during the tenure of the Code. Within B&W, we are still proud of our innovations in size (the first 1,300 MW units, for American Electric Power) and efficiency (the first commercial, supercritical steam pressure unit, UP-1, that advanced the state of the art by leaps and bounds).

An even more fundamental example of this evolution is the change from riveting to welding. When riveting boilers prevented further pressure and temperature gains, B&W not only pioneered the fusion welding of pressure vessels, but the x-ray inspection of these welds as a way to ensure their soundness. The Code and its writers were able to adopt this new technology into accepted best practices.

In the 1950s, the advent of nuclear powered steam generators required the creation of a whole new type of design code (Section III, with design by analysis and consideration of the concept of low cycle fatigue failure). B&W is proud to have contributed a significant amount of testing data that underlies the Code design fatigue curves even today, because design methods and material performance cannot be separated from safe operation of critical equipment.

Far from being a cookbook, the Code provides a consistent starting point for everyone, with a variety of design and construction methods that allows for improvements in durability and cost while promoting competition. "Even after working with the ASME Code for decades, I still continue to find ways to improve on designs and processes," said senior pressure vessel designer Dana Moot.

The evolution of the Code continues, and frames some of the most significant challenges in power generation today. While the Boiler Code celebrates its 100th anniversary, it is a living document keeping pace with industry. Efforts to modernize it to address higher temperature operation and frequent load cycling are in full swing.

The pursuit of material design temperatures up to 760 °C, termed advanced ultra-supercritical (or A-USC) operation, is a prime example of contemporary challenges. (Today, supercritical power plants operate at 565 °C and even the most advanced units operate around 625 °C.)

The Boiler Materials Development Consortium, supported by the Department of Energy, the Ohio Coal Development Office, the Electric Power Research Institute, and companies such as B&W, Alstom Power, Babcock Power, and Foster Wheeler Corp., has led this effort for over 10 years now. Operation at higher steam temperature greatly improves plant efficiency; reducing fuel waste, waste production, fuel transportation cost, cost of electricity and carbon dioxide emissions.

The consortium has been proactive in terms of the Code throughout, introducing the first new thickness formula (Equation A-317) to the Code in many, many decades to provide greater accuracy for thicker components at high temperature. New materials (such as Special Metals 740H) are also being introduced into the Code through consortium-sponsored Code Cases.

While better materials and more accurate basic equations are the first steps in safe design, the Code is also being challenged to develop design rules that will provide the same levels of safety for high-temperature service, including consideration of load cycling which fundamentally degrades the life of high-temperature components. Even traditional plants, due to uneven demand and the need to maximize use of alternative but varying energy sources such as wind and solar energy, are facing concerns about load cycling.

Modernization efforts are highlighting issues such as the role of tools like finite element analysis and its verification and validation in high-temperature, high-pressure design, and the generation and use of complex materials data—issues which are not easily addressed.

There will always be a need for power and the industry must respond with options that are economically feasible and respect the environment. Developing safety standards for advanced power plants with higher efficiencies and fewer emissions, and for alternative energy sources such as concentrated solar power has already started the Code on the road to the next 100 years. ■

Babcock & Wilcox employees (past and present) **DAVE DEWEES, CRAIG JONES, MEGAN SLATER, PAUL WEITZEL, STEVE SCAVUZZO, DANA MOOT, PATRICIA BECKER, JIM TANZOSH,** and **RYAN CORNELL** contributed to this article.

An Ability to Adapt and Change

MADIHA EL MEHELMY KOTB, HEAD OF THE PRESSURE VESSELS TECHNICAL SERVICES DIVISION FOR REGIE DU BATIMENT DU QUEBEC AND PAST PRESIDENT OF ASME.

It was in the summer of 1981 that I was first introduced to the ASME Boiler and Pressure Vessel Code. I joined the engineering and technical support group of the Pressure Vessel Department of the Ministry of Labor of the Province of Quebec. This responsibility is now under La Regie du batiment du Quebec.

My duties and responsibilities were primarily to provide technical support to the group of inspectors who were charged with oversight of the provincial regulation respecting pressure vessels. The ASME Boiler and Pressure Vessel Code is adopted by reference in the regulation.

Our regulatory approach back then was the same as it is today, a cradle-to-grave approach. We covered all aspects of the life cycle of a boiler or a pressure vessel from design to being taken out of service, and confirmed every step in between—fabrication, installation, repair and modification, and in-service inspection.


MADIHA EL MEHELMY KOTB

The task was huge and the responsibilities were heavy to bear, but the rewards were great. Working in the public safety domain is no small task. It is more than just a profession. You really have to believe in what you are doing, and it becomes your mission.

What was a difficult task became easier as I got more familiar with the ASME Boiler and Pressure Vessel Code and got a better understanding and knowledge of it.

Years later, I became the Chief Boiler Inspector for the Province of Quebec, and this position led me to become the member representing the province on the National Board of Boiler and Pressure Vessel Inspectors. I also became the jurisdictional member representing the Province of Quebec on the Conference Committee of the BPV Code. In that role, I began to work with many Code committees.

Serving on ASME Code committees introduced me to recognized experts from industry and gave me the opportunity to interact with them. What an enriching experience!

Attending my first Code Week, when all the committees, subcommittees, and working groups meet, was an intimidating and challenging experience that allowed me to see hundreds of volunteers putting their own personal interests aside, and contributing their technical expertise and personal perspective in the development of a world-class document. Whether it was a question about welding, design, material, nondestructive examination, or conformity assessment, by attending and participating committee meetings I always learned new information and found new challenges.

Participating as ASME President in the 100th anniversary year of the Boiler Code was no small event. It allowed me to be part of the celebration. During the week of the Boiler and Pressure Vessel Code meeting in Seattle, Wash., held in conjunction with the National Board of Boiler and Pressure Vessel Inspectors, I had a chance to meet and celebrate with many of the staff and volunteers who devoted many years of their professional lives and endless hours of their personal and family time to contribute to the development of the Code.

I had a chance to reflect on the journey of the last 100 years and look at how far we evolved in the short time in which I have been personally involved. We moved toward accreditation of authorized inspection agencies, changed the publication cycle from three years to two, eliminated addenda, and restructured the Code committees. We wrote the new Section VIII, division 2, and we are working on the modernization of Section I. We also published the Codes in digital electronic format, and developed C&S Connect and CA Connect, internet portals for codes and standards and for conformity assessment.

These are just some examples of many efforts and many things that happened in the last few years that we considered unthinkable not too long ago. Our strength as an organization setting the standard is largely dependent on our capacity to adapt and change to meet today's needs.

My travel during this past year as President of ASME provided me the opportunity to recognize first-hand how our ASME Code is recognized as a premier document and how it is gaining worldwide recognition. The openness of our system and the efforts that were made to get the international communities involved in our standards development has definitely paid off and made us a stronger, richer organization. The delegates program and the international working groups that have been established in different countries have been very successful. They not only opened us to the world but also opened the world to us. Many delegates and members of our international working groups were present in Seattle and took part in our anniversary celebration.

There is no telling how the Boiler Code will look 100 years or even 50 years from now. It may have technical requirements that we cannot imagine today. No one can predict how the committees will be struc-

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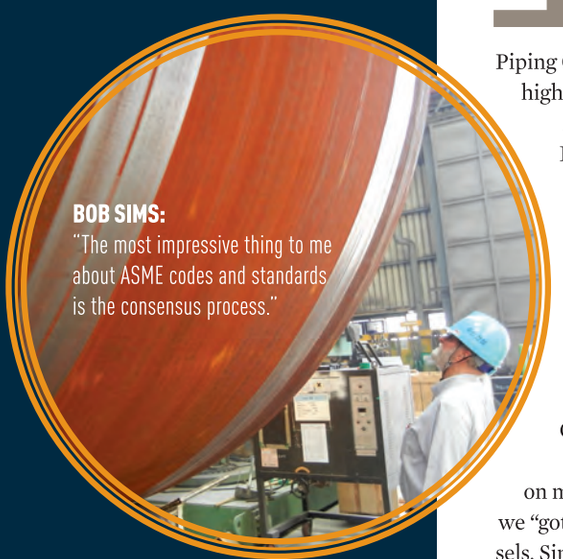

BOB SIMS:
"The most impressive thing to me about ASME codes and standards is the consensus process."

tured or conduct business. We cannot say what the format of the finished document will be.

One thing is certain, though. ASME will keep up with technological advances and will adapt as the state of the art advances. The Boiler Code will not change, however, in one single aspect, which is the one for which it was first developed, safety.

The Code will continue to be widely used and adopted, will have a bigger and larger input from all over the world, will have further outreach and adoption by far more countries, will contribute to the safety of billions of people, and will make the world that they live in a better place. ■

Consensus Rules for More Than 100 Years

BOB SIMS, DISTINGUISHED FELLOW, BECHT ENGINEERING LTD., AND PRESIDENT OF ASME.

I first became involved in Code activities when the Special Working Group (now Subgroup) on High Pressure Vessels was formed in 1981. I was immediately impressed with the expertise, hard work, and dedication that my fellow committee members showed in drafting a new "clean sheet" code for high pressure vessels.

This effort was initiated by a small group of volunteers, working with the staff, as a result of technical papers presented at Pressure Vessel and Piping Conferences in the late 1970s. They documented failures that had occurred in high pressure vessels.

At that time, the rules in the existing pressure vessel codes, such as the ASME Boiler and Pressure Vessel Code, Section VIII, Divisions 1 and 2, were not adequate, so the vessels were designed as "state specials." Because of the unique requirements for materials and design rules covering thick wall construction and specialized fabrication requirements such as autofrettage, it was difficult for regulatory authorities to determine whether these vessels were safe.

One of the great strengths of the ASME codes and standards development process is the ability to identify the need for new rules and to assemble the world's leading experts in the field to develop the rules. In the case of the high pressure vessel code, experts from the United States, Canada, the United Kingdom, Sweden, Germany, and Japan all made significant contributions.

It took 17 years of hard work, including extensive reviews by hundreds of experts on many committees, subcommittees, subgroups, and working groups, to be sure that we "got it right" before first publication of Section VIII, Division 3 on High Pressure Vessels. Since that time, the maintenance of Division 3 has resulted in the addition of rules for composite wrapped vessels and rules for hydrogen service, among many other updates.

The most impressive thing to me about ASME Codes and Standards is the consensus process that has been honed over 100 years to ensure that the views of all stakeholders are considered, but also to ensure that no one stakeholder group can dominate the process. It is also gratifying to see the many thousands of volunteers who dedicate so much time and energy to the development and maintenance of ASME codes, standards, and the associated certification processes.

We hear a lot about the so-called "Me Generation," but anyone who is active in Standards and Certification can tell you that does not apply to S&C volunteers. Participation from outside of North America is extensive and is growing. This is in contrast to codes and standards activities in some other parts of the world, which often limit participation to a selected group.

ASME Codes have resulted in saving thousands of lives by improving the integrity of not only pressure equipment, but also items as diverse as elevators and cranes. ASME has an excellent and well-deserved reputation worldwide for producing high quality codes and standards that meet the needs of manufacturers and materials suppliers, equipment users, regulators, and other stakeholders.

The complexities of modern technology demand more attention to codes and standards and ASME enters the second 100 years of this activity ready to meet those needs in many areas, such as alternative energy sources and advanced manufacturing. ■

Elevating the Pressure and Temperature

DAVID L. BERGER, SENIOR STAFF SCIENTIST/ENGINEER AT PPL GENERATION, LLC, CHAIR OF THE ASME COMMITTEE ON POWER BOILERS (BPV SECTION I).

Codes and standards have a twofold purpose. The paramount reason for standards is to assure that equipment is safe—safe for people who work around it and safe for the general public. The second main reason is to promote commerce by achieving uniformity, interchangeability, or at least compatibility. Within that backdrop, standards should also strive to assure that equipment can be used for economic benefit.

In the process of give and take that produces standards, each stakeholder not only presents his concerns, but also shares his expertise. Products that meet the Code are not only safe as long as they are built, maintained, and operated according to appropriate standards, but they are also expected to provide a reasonably long life over which they can be reliably operated for economic benefit.

As an employee of an electrical generation company, I am interested in technologies that will make units more efficient. By burning less fuel, my company saves money, and it is easier for us to comply with new emission regulations and remain competitive. Ultra-supercritical steam generators are a current trend toward greater efficiency, promising to push to ever higher temperatures and pressures than today's supercritical units.

Supercritical steam generators aren't boilers in the strict sense. Water heated above critical pressure of 3,208 psi (221 bar) does not boil, per se. Since the pressure in the furnace walls is above the vapor dome of the water-steam system, there is no phase change from water to steam. Unlike in a subcritical drum-type boiler, there is no point in the cycle where evaporation occurs at constant temperature; rather each unit of thermal input raises the fluid temperature. Final temperatures of the fluid to the turbine rarely exceed 1,100 °F on existing units.

For tomorrow's units, the industry will push for higher temperatures, since thermal efficiency is limited by the peak temperature of the cycle. Higher efficiency means less fuel for the work output,

DAVID L. BERGER: New challenges involving creep, fatigue, and corrosion.

1955

NUCLEAR BEGINNINGS

The Boiler and Pressure Vessel Committee appoints a special committee on nuclear power, the predecessor to the Boiler and Pressure Vessel Code Section III Committee.

saving money and reducing emissions, especially of carbon dioxide.

I Chair the BPV I standards committee on Power Boilers (Section I of the ASME Boiler and Pressure Vessel Code). In that capacity, I charged a task group to investigate modernization of Section I's rules to better accommodate the challenges of increasing temperature.

There can be no question about the safety of ultra-supercritical steam generators under the ASME Boiler and Pressure Vessel Code. Safety is never a negotiable goal.

At very high pressures and high temperatures, current Section I rules require components to be comparatively thick, but making things thicker is not always better. In thick components, temperature gradients and consequent differential thermal expansion produce large secondary stresses. When pressure and temperature drive a component's thickness to be very large compared to the size of the component, it can compromise that component's ability to endure thermal transients that occur in service.

Repeated cycles of heating and cooling can thermally fatigue components. And those cycles are certainly a reasonable expectation because tube leaks, air heater washes, and other events require a plant to shut down for repair or replacement of parts. Many of the Section I devices built for domestic power generation over the last two decades are heat recovery steam generators (HRSGs), essentially waste heat boilers that use the heat from the exhaust gas of a combustion turbine in combined cycle plants. Such units are characterized by fast startup and shutdown, plus a large turndown to follow demand, consequently their components endure a lot of thermal fluctuation.

One of the biggest challenges in addressing elevated temperature service will be understanding creep and fatigue interaction and developing appropriate design rules to manage that. Another challenge is that corrosion mechanisms change with increasing temperature. The push to higher temperatures will spawn development of new materials to meet all the design goals. The committee will also need to evaluate whether some of the construction details traditionally used will be appropriate at higher temperatures.

As a person who has many friends who work in operating power plants on a daily basis, I am very concerned with "keeping the steam in the pipe." ASME and other standards are one source of help to that end.

Participating in Codes and Standards development helps me in many ways. It helps me understand how to apply the rules properly. I learn the rationale for new rules. I interject my thoughts as a user and have a voice to shape the rules with a focus on what happens to the equipment after it is built.

Above all, my colleagues and I better protect our people working in the plants. ■

An Imprint for the Latest Technology

LIBO ZHANG, VICE DIRECTOR, TOTAL QUALITY MANAGEMENT OFFICE, HARBIN BOILER CO. LTD., HARBIN, CHINA.

The ASME Boiler and Pressure Vessel Code reflects the latest technology and research results to guide manufacturers of boilers and pressure equipment. The Code is recognized around the world.

As a leading supplier of utility boilers and pressure vessels, Harbin Boiler Co. Ltd. must assure its customers that the R&D, manufacturing, and servicing behind its products are in line with the international standard and can be marketed to the world. Application of the ASME Code is the only solution.

HBC got to know ASME Codes in the early 1980s. In 1987, HBC became the first manufacturer of utility boilers in China to obtain ASME Authorization Certificates and Code stamps S (power boilers), U (pressure vessels), and U2 (alternative rules for pressure vessels). HBC obtained the National Board Authorization Certificate and Code stamp R (repair and alteration of boilers) in 1996.

In 2004, HBC completed manufacturing the first product project with the U stamp—24 oil tanks and gas tanks for the Three Gorges Zuoan Power Plant. In 2007, HBC obtained Authorization Certificates and Code stamps N and NPT, confirming competence in construction of a wide range of equipment for nuclear power plants, and NS accreditation certification for supports.

During the course of obtaining ASME certificates and Code stamps, HBC enhanced its design capability and manufacturing level, promoted its technology and management levels, further improved its quality and management system, and greatly strengthened its comprehensive competitiveness in the market.

After HBC obtained the ASME accreditation, the ASME Codes have been applied in the design, manufacture, and inspection of 300 to 1,000 MW subcritical, supercritical, ultra-supercritical, and circulating fluidized bed boilers. HBC has also adopted the Code in the design and manufacturing of petrochemical vessels and power plant auxiliary equipment. In addition, ASME codes provided great help for our products in entering the field of nuclear power equipment.

At present, domestic and international customers generally specify that the equipment is to be designed and manufactured according the appropriate technical codes and the ASME codes for design, manufacture, and inspection. Thus it can be seen that ASME codes have been deeply recognized by users.

By conforming to the ASME Code, HBC's products can better integrate with the world market, and meet the requirements of the market and owners with widely recognized authority. HBC's products get more trust from owners at home and abroad, and HBC will continue to keep its domestic leading position in technology. HBC's products have successfully entered the international market and are exported to more than ten countries, including India, Turkey, and Brazil.

ASME codes have enhanced HBC's market share and reputation in China, and sped up development of overseas business, by lending credibility to its boiler and pressure vessel equipment in the global market. The choice to implement ASME codes was a strategic move for HBC in carrying out its plans for long-term development. ■

GOING ULTRA-SUPERCRITICAL
Harbin built China's first domestic 1,000 MW ultra-supercritical boiler for the Yuhuan Power Plant.

2008

5

A NEW LANGUAGE
The Shanghai Power Equipment Research Institute, working in agreement with ASME, translates Boiler and Pressure Vessel Code Sections III and XI into the Chinese language.

100 years ESSENTIAL FOR SAFETY

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"Even though FWPMCL fabricates boiler pressure parts to many international codes and standards, the vast majority of those components are fabricated to the ASME Code."

Strong Branding for World Recognition

XIAOMING DING, GENERAL MANAGER, FOSTER WHEELER POWER MACHINERY CO. LTD, XINHUI, CHINA, AND TOM LESH, VICE PRESIDENT, QUALITY, FOSTER WHEELER POWER GROUP ASIA, SHANGHAI, CHINA.

Foster Wheeler has been designing and supplying steam generation equipment to customers around the world since the company formed in 1927. During these past 87 years (and counting), the ASME Boiler and Pressure Vessel Code has played an integral role in supporting the success of our business. Two prime examples of this support come to mind.

First, the Code has supported Foster Wheeler in maintaining the integrity of our brand and our reputation for consistently delivering high-quality products globally at a competitive price.

Many years ago, we recognized that in order to remain competitive we would need to start a systematic process of transitioning a significant portion of our manufacturing, sourcing, and engineering to Asia. That process was rife with challenges, not the least of which was to ensure that we continue to deliver the same high quality product associated with our brand.

We're proud to say we've succeeded with flying colors in doing just that. That success can in large measure be directly attributed to our reliance on and adherence to the Code. The Code was and continues to be a stabilizing factor through the growth and maturing of our Asian operations.

Foster Wheeler Power Machinery Co. Ltd. (FWPMCL) was established in China over 20 years ago and is today Foster Wheeler's largest manufacturing facility. FWPMCL possesses an impressive résumé, supplying high-quality boiler pressure part components for the entire range of Foster Wheeler designs such as super- and subcritical pulverized coal and circulating fluidized bed equipment, heat recovery steam generators, and waste heat and solar boilers to customers around the world.

Our steam generating units range in size from fully shop assembled oil- and gas-fired package boilers for industrial use, to the largest boilers in operation today for power generation. Our long-time global customers are today supremely confident in FWPMCL's ability to consistently deliver high-quality products.

Second, ASME Certification is an essential marketing tool for Foster Wheeler, both in China and globally.

Foster Wheeler, along with our customers, recognizes that the Code Certification Mark is the hallmark of qualification and acceptance to the highest standard of excellence. The Code is accepted internationally, in over 100 countries, as it applies to the design, workmanship, inspection, and most important, the safety of fabricated boiler components.

When our customers purchase boiler pressure parts built to the ASME BPVC, stamped or unstamped, they understand that we, as a holder of an ASME Certificate of Authorization have undergone a rigorous qualification process to achieve the level of this standard. It assures them that we have a comprehensive quality system and that it is effectively implemented and monitored for compliance with the Code. As such, all Foster Wheeler manufacturing facilities are proud holders of ASME Certificates of Authorization. For example, FWPMCL in China holds both 'S' and 'PP' stamps. And even though FWPMCL fabricates boiler pressure parts to many international Codes and Standards including GB (China), METI (Japan), IBR (India), MOM (Singapore) and PED/EN (Europe), the vast majority of those components are fabricated to the ASME Code.

Additionally, 90 percent of the goods we manufacture at FWPMCL are exported outside of China, and much of that product is built to the Code. In China, the fabrication of pressure parts for the power generation industry is generally handled by state-owned boiler manufacturers.

We do have a small market share here in China with some very loyal and discriminating customers. When we supply equipment to our Chinese customers we fabricate to the GB (China) Code. However, they recognize that we are a world-class boiler manufacturer that is located in their backyard and that we possess a comprehensive and mature quality management system that is rooted by the ASME Code. This assures that the quality of our GB products is no different from that of an ASME BPVC stamped manufactured item that we would ship anywhere else around the world. Simply put, they want our products in their plants.

Foster Wheeler would like to thank all the dedicated and talented people who have been involved with ASME over the years and congratulate you on your first century of excellent service. ■